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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/707,592	12/23/2003	Robert Brule	45283.102	1591

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EXAMINER
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BALDWIN, GORDON

ART UNIT	PAPER NUMBER
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1775

DATE MAILED: 09/28/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/707,592	<b>Applicant(s)</b> BRULE ET AL.	
	<b>Examiner</b> Gordon R. Baldwin	<b>Art Unit</b> 1775	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 21 July 2006.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### **Examiner's Comment**

In the specification, the applicant states that, "the term "fired" refers to the ceramic material after it has been heated above a temperature where a substantial proportion of organic material within the ceramic material has burned out. A fired seal may or may not be sintered." Therefore sintering is not considered to be the same as firing and the article of claim one is considered to be a seal in a "fired" state.

### ***Claim Objections***

**Claim 1** is objected to because of the following informalities: A possible typographical error in line (3) of claim 1 where "than" is spelled "then." Appropriate correction is required.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

**Claims 1-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fan et al. Pub. No. 2004/0104544 A1, and further in view of De Jager, Patent No. 5,439,627.**

**Consider claim 1**, Fan teaches a high temperature gas seal that contains ceramic components and fibers as well as ceramic particles (considered to be ceramic powder) (Para. 0018) and binder (Para. 34). Fan also teaches the adding of a reactive component(s) such as metallic powders containing aluminum or zirconium (Para. 0019) to the corresponding ceramic material, which in most cases decrease the porosity, such is the case with alumina particles. (Para 0021) If alumina felt is loaded with aluminum particles and followed by oxidation to alumina, the porosity can be reduced to less than 40% and can be tailored to arrive at the final porosity between that and the original porosity or the ceramic felt. A porosity of 15% to 35 % is more preferred. (Para. 0021) Since Fan only mentioned oxidation and not sintering, the seal is considered unsintered and in a pre-fired state. Additionally, since binder has a low melting point (as explained later in De Jager), the heat treatment or firing of Fan is considered to cause the seal to be substantially free of any binder.

However, Fan does not teach that in most but not all cases (Para. 0021) that after the fired or heat treatment state the ceramic seal is to have a higher porosity and be substantially free of binder. De Jager teaches in the manufacture of reinforced compositions using composites and laminates reinforced with long or continuous fibers or filaments with ceramic matrix composites (Col. 1 lines 5-12), the use of binder, which is removed by heating (Col. 6, lines 11-14). Since binder is removed by heating, the binder is considered to be substantially removed once the heating process is begun due to its low melting point of 150 185 degrees (Col. 6 lines 10-14). De Jager also teaches that matrix particle (ceramic structure with fiber and filaments) present between the

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monofilaments keeps the filaments spaced, and the pre-form or molded structure becomes more and more porous during debinding (time required for binder removal by heat(Col. 6 lines 10-14)). (Col. 6 lines 25-31) By this statement in De Jager, when the ceramic item containing binder, is heated (or fired) the binder will be removed, and with the binder being removed, the fibrous particles in the ceramic matrix will increase in porosity.

It would have been obvious to a person of ordinary skill in the art at the time of invention to combine the high temperature gas seals with adjustable porosity of Fan with De Jager's methods of manufacturing reinforced compositions with binders that increase porosity minimally to be able to design seals with lower porosity through combining metal powders with certain binders which can maximize physical strength and density.

Additionally, the addition of, "said seal formed from firing and unfired state...which increases upon firing." Is considered to be a product –by-process limitation, "[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process.", (In re Thorpe, 227 USPQ 964,966). Once the Examiner provides a rationale tending to show that the claimed product appears to be the same or similar to that of the prior art, although produced by a different process, the burden shifts to applicant to come forward

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with evidence establishing an unobvious different between the claimed product and the prior art product (*In re Marosi*, 710 F.2d 798, 802, 218 USPQ 289, 292 (Fed. Cir. 1983), MPEP 2113).

**Consider claim 2**, Fan teaches that the gas seals are to be used in solid oxide fuel cells, and the seals must be able to withstand working temperatures that may exceed 1000 degrees Celsius. (Para. 0003) Working temperatures that can exceed 1000 degrees Celsius are considered to be high temperature for fuel cell uses.

**Consider claim 3**, Fan teaches a high temperature gas seal that contains ceramic components and fibers as well as ceramic particles (considered to be ceramic powder). (Para. 0018) Fan also teaches the adding of a reactive components such as metallic powders containing aluminum or zirconium. (Para. 0019)

**Consider claim 4-6**, Fan teaches the conversion of the reactive component to the corresponding ceramic material will, in most cases, result in volume expansion and corresponding decrease in porosity of the seal. In a standard impregnation of alumina felt with alumina particles, the porosity decreases from approximately 85% to 55%. (Para. 0021) However, if alumina felt is loaded with aluminum particles and followed by oxidation to alumina, the porosity can be reduced to less than 40% and can be tailored to arrive at the final porosity between that and the original porosity of the ceramic felt. A porosity of 15% to 35 % is more preferred. (Para. 0021) Therefore, porosity variations from 15% to 85% are considered to be taught by Fan. Due to Fan only mentioning oxidation and not sintering, the seal is considered unsintered and in a pre-fired state.

**Consider claim 7**, Fan teaches the mixing of ceramics and metal powder in wet techniques including the tape casting process.

Additionally, claim (7) is considered a product-by-process due to it teaching a process by which the product is to be manufactured. Therefore, even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. "The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." (MPEP 2113)

**Consider claim 8-10**, Fan teaches the conversion of the reactive component to the corresponding ceramic material will, in most cases, results in volume expansion and corresponding decrease in porosity of the seal. In a standard impregnation of alumina felt with alumina particles, the porosity decreases from approximately 85% to 55%. (Para. 0021) However, if alumina felt is loaded with aluminum particles and followed by oxidation to alumina, the porosity can be reduced to less than 40% and can be tailored to arrive at the final porosity between that and the original porosity of the ceramic felt. A porosity of 15% to 35 % is more preferred. (Para. 0021) Therefore, porosity variations from 15% to 85% are considered to be taught by Fan. Due to Fan only mentioning oxidation and not sintering, the seal is considered unsintered and in a pre-fired state.

Additionally, De Jager teaches that matrix particles (ceramic structure with fiber and filaments) present between the monofilaments keep the filaments spaced, and the

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pre-form or molded structure becomes more and more porous during debinding (time required for binder removal by heat(Col. 6 lines 10-14)). (Col. 6 lines 25-31)

By this statement in De Jager, when the ceramic item containing binder, is heated (or fired) the binder will be removed, and with the binder being removed, the fibrous particles in the ceramic matrix will increase in porosity.

By the teachings of both Fen and De Jager it is considered obvious to one having ordinary skill in the art at the time of the invention to adjust the aluminum oxidation and the binder burn-off for the intended application of having a fired porosity of between 40% -50%, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

### ***Response to Arguments***

Applicant's arguments filed 7/25/2006 have been fully considered but they are not persuasive.

The applicant argues that it is not obvious for one skilled in the art to combine the teachings of Fan and De Jager. However, the applicant recognizes the removal of binder from a ceramic matrix by heating processes, which is taught by Fan (Para. 0020). The amendment of claim 1, is considered to claim a fired, not-sintered, seal with a porosity of less than 50%, being substantially free of binder with the rest of the claim being classified as a product-by-process. In the Fan reference, a seal is taught to being in an un-sintered state, but is heat-treated (Para. 0020), which is considered to be fired.



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Then, Fan also teaches that the heat treatment will in most, **but not all situations**, cause a decrease in porosity, with an un-sintered porosity that can be reduced down to 15-35%. (Para. 0021)

***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gordon R. Baldwin whose telephone number is (571)272-5166. The examiner can normally be reached on M-F 7:45-5:15.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jennifer McNeil can be reached on 571-272-1540. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

GRB



JENNIFER C. MCNEIL  
SUPERVISORY PATENT EXAMINER

9/24/06